WHAT IS CLAIMED IS:

1. An optical pickup comprising optical elements, light from a light source traveling via the optical elements so as to be collected on an information recording medium, the optical elements comprising:

a collimator lens that collects divergent light from the light source so as to form parallel light;

a beam shaping element that alters an intensity distribution of the parallel light in cross-section; and

an objective lens that collects light passing through the beam shaping element onto the information recording medium,

wherein the optical elements comprise an optical element that is secured to a supporter so as to generate first astigmatism due to deformation caused by a temperature change, wherein the deformation caused by the temperature change is generated due to a difference in linear expansion coefficient between the optical element that generates the first astigmatism and the supporter, and

the first astigmatism is equal in size and is opposite in polarity to a second astigmatism that occurs when the parallel light passes through the beam shaping element, the parallel light having a phase distribution generated by a difference between: (a) an amount of a change in optical path length between a luminous point of the light source and a principal point of the collimator lens, which results from thermal expansion or thermal contraction of a structure including the light source and the collimator lens due to the temperature change; and (b) an amount of a change in focal length of the collimator lens.

2. The optical pickup according to claim 1, wherein the first astigmatism is generated by utilizing the optical element generating the first astigmatism that has a difference in deformation amount between different directions when the temperature is changed.

3. The optical pickup according to claim 2, wherein the difference in deformation amount between the different directions is generated by making a size of a bonded surface where the optical element generating the first astigmatism is bonded to the supporter different between the different directions.

4. The optical pickup according to claim 2, wherein the difference in deformation amount between the different directions is generated by forming separately provided bonded surfaces where the optical element generating the first astigmatism is bonded to the supporter so that a length between the separately provided bonded surfaces is made different from a size of the bonded surfaces in a direction perpendicular to a direction of the length.

5. The optical pickup according to claim 2, wherein the difference in deformation amount between the different directions is generated by forming separately provided bonded surfaces where the optical element generating the first astigmatism is bonded to the supporter, the separately provided bonded surfaces being different in deformation amount in their height direction when the temperature is changed.

6. The optical pickup according to claim 2, wherein the different directions correspond to a beam shaping direction by the beam shaping element and a direction perpendicular to the beam shaping direction.

7. The optical pickup according to claim 1, wherein the optical element generating the first astigmatism is a mirror that is provided at a position before or after the parallel light passes through the beam shaping element.

8. The optical pickup according to claim 1, wherein the optical element generating the first astigmatism is the beam shaping element.

9. The optical pickup according to claim 1, wherein the optical element generating the first astigmatism is a plate made up of parallel planes or made up of non-parallel planes, which allow parallel light to pass through.

10. The optical pickup according to claim 1,

wherein there are a plurality optical elements that generate the first astigmatism, and

each of the plurality of optical elements shares the generation of generating of the first astigmatism.

11. An optical pickup, comprising:

a light source;

a collimator lens that collects divergent light from the light source so as to form parallel light;

a beam shaping element that alters an intensity distribution of the parallel light;

an objective lens that collects light passing through the beam shaping element onto an information recording medium; and

a parallel plate that is disposed between the light source and the collimator lens,

wherein an inclination angle of the parallel plate with respect to an optical axis is changed with a variation amount of temperature.

12. The optical pickup according to claim 11, wherein the inclination angle of the parallel plate is changed due to thermal deformation of a supporter that supports the parallel plate.

13. An optical pickup, comprising: a light source; and a collimator lens that collects divergent light from the light source so as to form parallel light, whereby the light from the light source is collected onto an information recording medium,

wherein the light source and the collimator lens are attached to a base, and

a change in optical relationship concerning image-formation, which is generated from: a change in optical path length between a luminous point of the light source and a principal point of the collimator lens due to a temperature change; and a change in focal length of the collimator lens, is compensated for with a shift of a relative position between the base and at least one of the light source and the collimator lens.

14. The optical pickup according to claim 13,

wherein the collimator lens is secured to the base so that positions of the principal point of the collimator lens and the base do not shift relatively when a temperature is changed,

the light source is attached to the base via a supporter, and

the change in optical relationship concerning image-formation is compensated for with a shift of a relative position between the luminous

point of the light source and the base, which results from deformation or shift of the supporter due to a temperature change.

15. The optical pickup according to claim 13,

wherein the light source is secured to the base so that positions of the luminous point of the light source and the base do not shift relatively when a temperature is changed,

the collimator lens is attached to the base via a supporter, and

the change in optical relationship concerning image-formation is compensated for with a shift of a relative position between the principal point of the collimator lens and the base, which results from deformation or shift of the supporter due to a temperature change.

16. The optical pickup according to claim 13,

wherein the light source and the collimator lens are each secured to the base via a supporter, and

the change in optical relationship concerning image-formation is compensated for with: a shift of a relative position between the luminous point of the light source and the base, which results from deformation or shift of the supporter of the light source due to a temperature change; and a shift of a relative position between the principal point of the collimator lens and the base, which results from deformation or shift of the supporter of the collimator lens due to a temperature change.

17. An optical pickup, comprising:

a light source;

a collimator lens that collects divergent light from the light source so as to form parallel light;

a beam shaping element that alters an intensity distribution of the parallel light;

an objective lens that collects light passing through the beam shaping element onto an information recording medium; and

a phase plate with concentric steps, the phase plate being disposed at a position before or after the collimator lens,

wherein the phase plate is designed so as to correct a phase distribution of light that is generated due to a temperature change in a structure including the light source and the collimator lens into a state

before the light enters the beam shaping element to be converted back into a plane wave.

18. The optical pickup according to claim 17,

wherein the phase plate is a stepped plate that allows a phase of light to change from inside to outside in accordance with a change in wavelength due to a change in temperature of the light source, a center of the concentric circles coinciding with a center of an optical axis, and

a step height of each step allows the phase of light to shift by an integral multiple of the wavelength with respect to a certain degree of temperature.

19. The optical pickup according to claim 17,

wherein the phase plate is a stepped plate that allows a phase of light to change from inside to outside in accordance with a change in wavelength due to a change in temperature of the light source, a center of the concentric circles coinciding with a center of an optical axis, and

a length Ri from the center of the phase plate to the i-th step is represented by the following formula:

$$Ri = f \times (1 - (1 - 2 \times N \times i / 1000 / \delta)^2)^{1/2}$$

wherein f denotes a focal length of the collimator lens in an initial state, δ is a difference between an amount of a change in optical path length between a luminous point of the light source and the collimator lens and an amount of a change in focal length of the collimator lens with respect to a temperature change ΔT that corresponds to a change in wavelength of the light source by 1 nm, and N and i are integers of 1 or more.

20. The optical pickup according to claim 17,

wherein the phase plate is a stepped plate that allows a phase of light to change from inside to outside in accordance with a change in wavelength due to a change in temperature of the light source, a center of the concentric circles coinciding with a center of an optical axis,

a step height Dp of each step is represented by the following formula:

$$Dp = N \cdot \lambda / (n - 1)$$

wherein λ denotes a wavelength of the light source in an initial state, n denotes a refractive index of the phase plate, and N is an integer of 1 or

more, and

a length Ri from the center of the phase plate to the i-th step is represented by the following formula:

$$Ri = f \times (1 - (1 - 2 \times N \times i / 1000 / \delta)^2)^{1/2}$$

wherein f denotes a focal length of the collimator lens in an initial state, δ is a difference between an amount of a change in optical path length between a luminous point of the light source and the collimator lens and an amount of a change in focal length of the collimator lens with respect to a temperature change ΔT that corresponds to a change in wavelength of the light source by 1 nm, and N and i are integers of 1 or more.

21. The optical pickup according to claim 17, wherein the collimator lens and the phase plate are integrated.